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A 58.9
R 31
ARS 42-87

ARS 42-87
AUGUST 1963

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service

ONE-BALE CAPACITY SEED COTTON CONTAINER FOR USE AT COTTON GINS

1/
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INTRODUCTION

Cotton harvesting practices have undergone considerable change during recent years. As a result of this change, the ginning season has been shortened and gin-yard congestion during the height of the harvesting season has become a major problem for both the ginner and the producer. When the gin is unable to keep pace with harvesting operations, seed cotton transport units are forced to serve as temporary storage facilities on the gin yard. Lack of adequate transport or storage facilities may halt or seriously curtail harvesting operations.

One problem associated with gin-yard congestion is that of preserving fiber and seed quality. Excessive moisture and green matter in seed cotton stored for even a short time may result in quality deterioration. Harvest delays caused by a lack of transport units may result in quality deterioration in the field.

Increased gin capacity, fixed storage facilities on the farm and at the gin, and increased transport fleet to serve as temporary storage facilities are three means of lessening the problem of preserving fiber and seed quality.

It is not the intent of this publication to discuss the relative merits of each of the above means for alleviating gin-yard congestion and shortage of transport and storage facilities. The all-metal, one-bale capacity seed cotton container described in this publication was designed to provide an easily portable standard-size transport unit which could be used for temporary seed cotton storage.

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FACTORS AFFECTING SELECTION OF TRANSPORT UNIT

The development of the one-bale capacity seed cotton container was based on a study of several factors. Among the primary factors were the following: (1) Capacity, (2) dimensions, (3) construction materials, and (4) method of handling.

Capacity

Seed cotton is transported to the gin in trucks and trailers of various capacities. In the Southeastern States a large quantity of seed cotton is transported to the gin in one-bale capacity pickup trucks. Multibale trucks and trailers are also used extensively. The multibale transport units can present a problem at gins where no seed cotton scales are available. Miscalculations on the part of the ginner may result in a final bale that is either too small or too large. Seed cotton moisture content, amount of tramping of seed cotton in the transport unit, and other factors contribute to wide variations of actual weight of seed cotton contained in multibale transport units. Although these same factors affect the weight of seed cotton in one-bale capacity units, the variations are usually not sufficient to result in overweight of or underweight bales.

Transport unit capacity may also be related to the method of harvest and the rate of harvest. Hand-harvested cotton requires no particular size transport unit and only enough units to conform to the rate of harvest. Machine-harvested cotton requires not only a transport unit sized for efficient handling, but also enough units to conform to the rate of harvest.

Dimensions

Among the factors influencing transport-unit dimensions are volumetric requirements, size and load capacity of the transport vehicle, special loading and unloading requirements, and local and State highway regulations.

Approximately 200 cubic feet of seed cotton is required to produce one 500-pound bale of lint. This volume may be reduced considerably with some tramping of the seed cotton. Volumetric requirements of a transport unit will therefore be governed by the desired bale capacity.

The size and load capacity of the transport vehicle will also govern transport-unit dimensions. Many sizes and load capacities are available in commercial transport vehicles, and almost any size or load capacity may be obtained by modification of available equipment.

Special loading or unloading requirements may influence transport-unit dimensions. Sufficient clearance must be available for dumping seed cotton from the picker basket into the transport unit. Transport-unit width and length must be great enough to prevent spillage of seed cotton during the dumping operation. The height of the unloading telescope at the gin may influence transport-unit height.

Highway regulations governing vehicle height, width, length, and weight vary from State to State. Transport-unit dimensions should conform to all applicable regulations.

Construction Materials

Strength, durability, weight, and cost are important factors in the construction of transport units. Method of construction and construction materials affect these factors.

The cost and weight of a transport unit may be reduced by sacrificing some strength and durability. Costs may also be reduced by using design dimensions to conform to standard dimensions of construction materials.

Use of expanded metal, perforated metal, hardware cloth, or similar material decreases the weight of the transport unit compared to a unit constructed of solid materials. Use of lighter and less expensive materials, however, may require changes in the method of construction that would result in no significant advantage.

Method of Handling

The method of handling seed cotton transport units is influenced by all the previously mentioned factors and these factors, in turn, are influenced by the method of handling.

Method of handling will also be influenced by transport methods. Three examples of transport methods are the self-contained motorized transport units (trucks), nonmotorized wheeled units (trailers), and containers for placement on motorized transport units or nonmotorized wheeled units, or both.

The first two examples require no specific method of handling other than that commonly used; however, facilities may be added for increased efficiency or for convenience. The third example requires some specific means for handling the containers.

CONTAINER DESIGN AND CONSTRUCTION

An evaluation of the primary and other factors led to the selection of an all-steel welded construction, one-bale capacity seed cotton container as the basic transport unit. Laboratory and field use has shown that the container can be used successfully as a seed cotton transport and storage unit. The container design and construction provide sufficient strength and durability to withstand the normal abuses encountered in the handling operations.

The container consists of a 2 x 2 x 3/16-inch angle iron frame with 3/4-inch, 13-gage expanded metal sides, ends, and bottom welded to the inside of the frame. Dimensions of the container are 7 feet 10 inches long, 3 feet 9 inches wide, and 6 feet high. Wooden spacers are attached to the bottom of the frame to provide sufficient height for the movement of the forklift tines during handling and to permit the free movement of air during storage. Net weight of the container is approximately 320 pounds. Details of the container are shown in figure 1.

Simplicity of design permits construction of the container in the farm or gin shop with regular labor. Container dimensions and construction materials may be modified to fit the needs of the individual ginner.

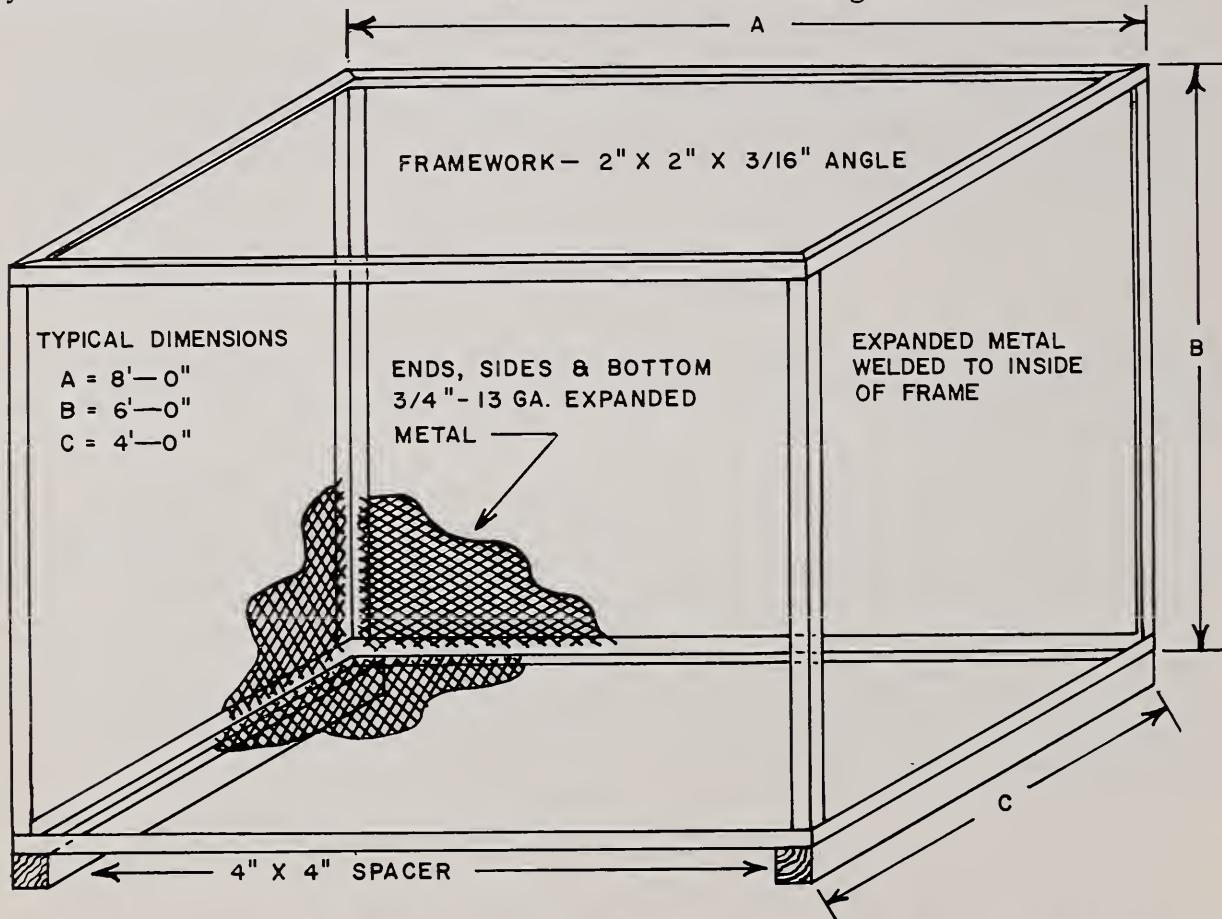


Figure 1. The One-bale capacity seed cotton container. Dimensions A, B, and C may be varied to obtain sufficient volume for one bale.

METHOD OF HANDLING AND TRANSPORTING CONTAINERS

The one-bale capacity seed cotton containers are handled by a tractor-mounted forklift attachment, capable of lifting 2 tons to a height of 10 1/2 feet. This type of forklift unit can be operated in off-pavement areas because the tractor tires provide bearing surface. The forklift removes filled containers and replaces empty containers on the transport vehicle. The forklift unit moves the containers about the gin yard to the unloading telescope, to seed cotton storage areas, or to empty container storage areas.

The seed cotton containers are transported by flatbed trucks, pickup trucks, and two-wheel trailers (Figs. 2 and 3).



Figure 2. One-bale capacity seed cotton containers transported on flatbed truck. The containers are side loaded and are handled with a tractor-mounted forklift attachment.



Figure 3. Seed cotton containers transported by pickup truck and two-wheel trailer.

Figure 4 shows the method of loading the containers on flatbed trucks or flatbed trailers. Side loading permits ease of loading and unloading but

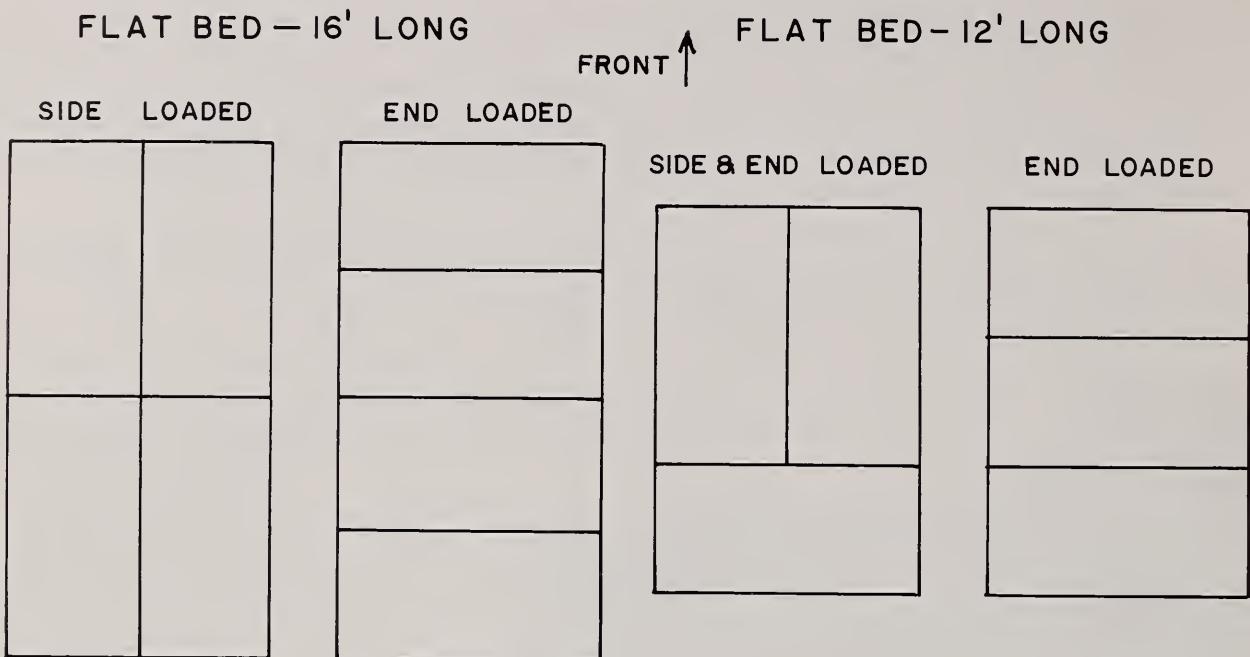


Figure 4. Diagram for loading seed cotton containers on flatbed trucks and trailers.

requires sufficient area around the vehicle for free movement of the handling unit. When loading filled or empty containers on the transport vehicle from the end, the tractor is used to push all containers into proper position and no special procedure or equipment is required. When unloading filled or empty container from the end, some means of moving the containers to the rear of the truck bed is required. Chains attached to the tractor may be used to pull the container to the end of the bed so that the fork tines can engage the container.

Containers on the transport vehicle may be filled in the field by providing elevated ramps for unloading from the picker basket or from pick sacks and sheets to the containers. Also, a pit designed to lower the overall height of the transport vehicle and containers may be used so the containers on the transport vehicle may be loaded with ease at ground level.

If the containers are filled on the ground, a forklift, a hoist mounted on the transport vehicle, or some other means is required to load the filled containers onto the transport vehicle.

Dumping seed cotton from the picker basket into the containers on the transport vehicle does not present a problem if two or more containers are to be filled; but if the containers are to be filled on the ground, several containers should be placed together to prevent spillage of seed cotton. A tarpaulin or burlap sheet placed around the containers will prevent spilled seed cotton from coming in contact with ground contaminants.

Tarpaulin caps fit over each container and extend down approximately one foot on the ends and sides where they are attached to the container (Fig. 5). Either these caps or tarpaulin sheets prevent seed cotton from



Figure 5. One-bale capacity seed cotton containers with individual tarpaulin caps.

being blown out during transport and provide some protection from rains during transport or on the gin yard.

Seed cotton containers can also be handled by a transport-vehicle overhead hoist assembly (Fig. 6). This assembly can be built so the entire unit may be easily attached or removed from the transport vehicle. The H-beam overhang should be at least one-half the width of the container. All containers are end

loaded and containers on the trolley can be moved with little effort. Filled containers can be loaded onto the transport vehicle in the field by backing the vehicle up to the container and hoisting the container onto the vehicle. For unloading the transport vehicle moves to the desired area and the hoist system removes the container. This method of handling seed cotton containers lacks the gin-yard maneuverability of the tractor-mounted forklift; however, the addition of the tractor-mounted forklift for gin-yard use will provide a versatile system.

Buildings, underpasses, telephone and power lines, trees, and other objects affording low clearances may prevent the use of an overhead hoist assembly in some areas. The overall height of the transport vehicle, container, minimum hook-to-hook distance of the hoist, trolley, H-beam, and minimum working distance between the container and lower hoist hook may exceed the minimum clearance of overhead objects.

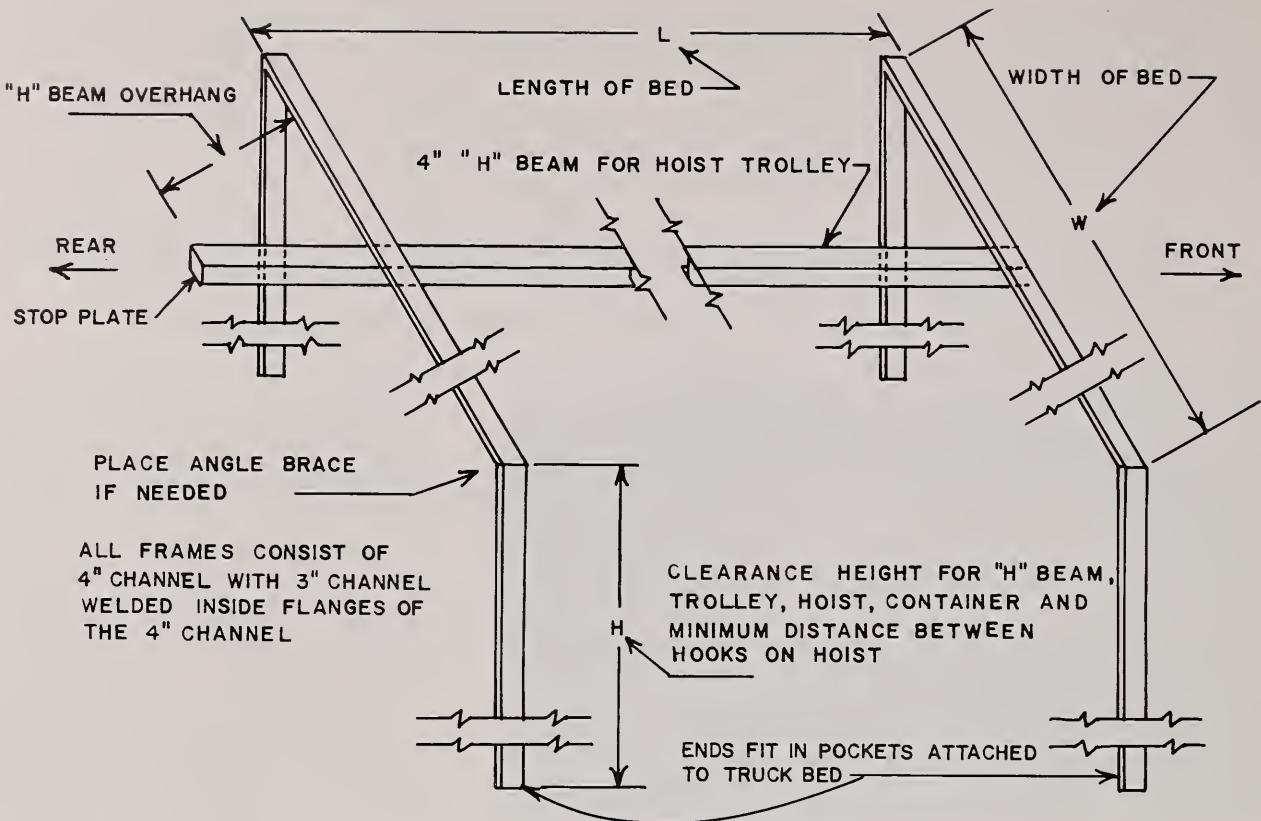


Figure 6. Diagram of frame for handling containers with truck-mounted overhead hoist assembly.

A fixed overhead electric hoist assembly designed by a commercial gin for handling one-bale capacity seed cotton containers at the gin has been highly successful. The overhead track extends from the unloading telescope outward from the gin building. The entire assembly is covered but is open on the sides and end. All containers are transported on pickup trucks and the containers are filled while on the truck in the field. When the container is delivered to the gin the truck is driven under the assembly and the container removed. The container is either moved to the unloading telescope for immediate ginning or stored under the covered area to await ginning. A general view of this system is shown in figure 7.



Figure 7. General view of container handling system at a commercial gin.

STORAGE OF SEED COTTON IN CONTAINERS

The selection of the one-bale capacity seed cotton container as the transport unit was influenced by its adaptability to seed cotton storage. Storage may be in the open, under covered sheds, or in totally enclosed buildings. Space requirements are minimized because the containers may be placed as close together as possible and only one side need be kept free for the movement of the forklift unit. Further reductions in space requirements may be achieved by storing the containers two-high (Fig. 8). The area required for storing four containers, when stacked two-high, is approximately 64 square feet.

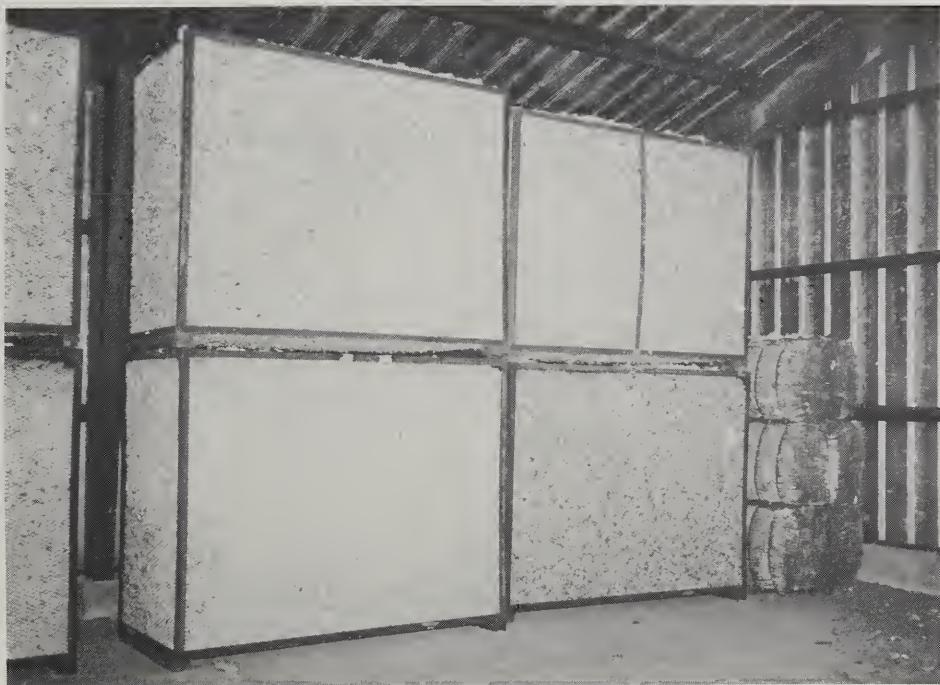


Figure 8. View of seed cotton containers placed two-high in storage.

ADAPTABILITY AND MODIFICATION OF CONTAINER EQUIPMENT AND SYSTEM

Container design and methods of handling are by no means limited to those discussed in this publication. Equipment and systems may be designed to fit the needs of the individual. Efficiency, economy, and convenience are important factors that must be considered.

Container dimensions and construction materials may be varied to meet the requirements of a particular system. Care should be exercised to limit container dimensions to normal dimensions of construction materials, to dimensions of the transport vehicle, and to the capacity and other limitations of the handling unit.

Relatively inexpensive forklift attachments are available for use on many of the tractors now in operation. The forklift load capacity and height of lift should be geared to the proposed system. The tractor-mounted forklift may be used for purposes other than that of handling seed cotton containers. When the forklift attachment is no longer needed, it may be removed to free the tractor for other operations.

The containers may be used for handling other commodities by making minor modifications at the end of the cotton season. A burlap or heavy paper liner on the inside of the container may make it suitable for handling grain, peanuts, and similar commodities. Since the bulk density of most other commodities is much greater than that of seed cotton, capacity of the container should be limited to prevent overloading the container or the handling unit, or both.

CARE AND MAINTENANCE OF CONTAINERS

The all-steel seed cotton container requires very little care and maintenance. To prevent possible contamination of seed cotton and damage to gin machinery, all scale should be chipped from the welds before the container is used. Application of a good metal paint to the entire container will minimize rust formation and permit outside storage of the containers during the off-season months.

Major damage to the container is usually the result of carelessness in the operation of the handling unit. Contact between the forklift tines and the expanded metal may cause a break in the sides or ends. The breaks should be repaired to prevent possible injury to those coming in contact with the container and to prevent loss of seed cotton. At the end of the season, paint should be applied to breaks and all other areas where the paint has been removed.

CONCLUSION

The one-bale capacity seed cotton container provides a transport unit as well as a temporary storage unit.

The container and tractor-mounted forklift attachment can be adapted to supplement existing equipment and methods of handling and storing seed cotton.

The containers and the handling unit can be used on projects and commodities other than cotton during the remainder of the year.

Containers can be constructed with regular labor in the farm or gin shop and modified to fit the needs of the individual ginner.

